Atty Docket: 19111.0042

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:	:	
R. Kothuri et al.	:	
Application No.: --	:	Examiner: --
Filed: June 22, 2001	:	Art Unit --

Title: QUERY PRUNING USING INTERIOR RECTANGLES IN AN R-TREE INDEX

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, DC 20231

Sir:

Prior to examination, please amend the above-identification as follows:

In the Specification:

Page 10, Paragraph 1:

Figs. 11a, [Fig. 11b, 11a and 11b] 11b, 12a, and 12b represent graphs that illustrate relationships between response time and query radius; and

Figs. 11a, 11b, 12a and 12b represent graphs that illustrate relationships between response time and query radius; and

Page 10, Paragrpah 2:

Figs. [12a, 12b, 13a, and 13b] 13a, 13b, 14a, and 14b represent graphs that illustrate relationships between total query time ad tiling level.

Figs. 13a, 13b, 14a, and 14b represent graphs that illustrate relationships between total query time ad tiling level.

Page 35, Paragraph 2:

[Fig. 11 shows] Figs. 11a and 11b show the results of comparison for the average query time with and without the intermediate filter that uses interior-rectangles for the query geometries. The queries identify all geometries that intersect the query windows. In the figures, the query window radius in miles is plotted along the x-axis and the query response in milliseconds is plotted along the y-axis. Both scales are logarithmic. Fig. 11(a) shows the results for the USBG dataset. Three time curves are plotted, the time for the primary filter (Primary curve), the time for primary+secondary filter (Regular curve), and the time for primary+intermediate+secondary filter (Interior curve). The last one reports the total time for a query when processed using interior rectangles. Using interior rectangle approximations improves query response times by around 25% for a query radius of 1 mile and about 50%, or a factor of 2, for a query radius of 2 miles. At a radius of 2 miles, a query on the USBG dataset returned around 350 geometries. The performance gain improves as query windows become larger. For instance, at larger radii of 10-100 miles, the performance improves by nearly 70%, in other words, approximately by a factor of 3. This is because as the query window becomes large, more and more candidate geometries fall inside the query interior and are straight away included in the result set bypassing the secondary-filter. This may be verified by the fact that the Interior curve is quite close to the Primary curve, which implies the time is spent in secondary-filter is less than 10% of the overall query time, which is less than 16% of the original secondary-filter overhead.

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Page 38, Paragraph 2:

[Fig. 14 illustrates] Figs. 14a and 14b illustrate the results for a "touch"-type of query interaction for the two datasets. The example also demonstrates that tiling level 4 produces a consistently good performance gain of about 30% for the USBG dataset and

nearly 75% for the ABI dataset. Similar results are also obtained for other interaction-type queries. From these results, it may be concluded that a tiling level of 4 can achieves good performance gains in many, if not all, cases.

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Respectfully submitted,

Date: June 22, 2001

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Figs. 11a, 11b, 12a and 12b represent graphs that illustrate relationships between response time and query radius; and

Figs. 13a, 13b, 14a, and 14b represent graphs that illustrate relationships between total query time ad tiling level.

Figs. 11a and 11b show the results of comparison for the average query time with and without the intermediate filter that uses interior-rectangles for the query geometries. The queries identify all geometries that intersect the query windows. In the figures, the query window radius in miles is plotted along the x-axis and the query response in milliseconds is plotted along the y-axis. Both scales are logarithmic. Fig. 11(a) shows the results for the USBG dataset. Three time curves are plotted, the time for the primary filter (Primary curve), the time for primary+secondary filter (Regular curve), and the time for primary+intermediate+secondary filter (Interior curve). The last one reports the total time for a query when processed using interior rectangles. Using interior rectangle approximations improves query response times by around 25% for a query radius of 1 mile and about 50%, or a factor of 2, for a query radius of 2 miles. At a radius of 2 miles, a query on the USBG dataset returned around 350 geometries. The performance gain improves as query windows become larger. For instance, at larger radii of 10-100 miles, the performance improves by nearly 70%, in other words, approximately by a factor of 3. This is because as the query window becomes large, more and more candidate geometries fall inside the query interior and are straight away included in the result set bypassing the

secondary-filter. This may be verified by the fact that the Interior curve is quite close to the Primary curve, which implies the time is spent in secondary-filter is less than 10% of the overall query time, which is less than 16% of the original secondary-filter overhead.

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